

10/534763

Rec'd PCT/PTO 13 MAY 2005

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
27 May 2004 (27.05.2004)

PCT

(10) International Publication Number  
WO 2004/043859 A3

(51) International Patent Classification<sup>7</sup>: C01B 31/08, 31/12, H01G 9/058

(74) Agent: OHIE, Kunihiwa; Ohie Patent Office, Horiguchi No. 2 Bldg. 7F, 2-6, Nihonbashi Ningyocho 2-chome, Chuo-ku, Tokyo 103-0013 (JP).

(21) International Application Number:

PCT/JP2003/014379

(22) International Filing Date:

12 November 2003 (12.11.2003)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2002-329490 13 November 2002 (13.11.2002) JP  
60/428,714 25 November 2002 (25.11.2002) US

(71) Applicant (for all designated States except US): SHOWA DENKO K.K. [JP/JP]; 13-9, Shiba Daimon 1-chome, Minato-ku, Tokyo 105-8518 (JP).

(72) Inventor; and

(75) Inventor/Applicant (for US only): TANAKA, Masako [JP/JP]; Showa Denko K.K., 13-9, Shiba Daimon 1-chome, Minato-Ku, Tokyo 105-8518 (JP).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

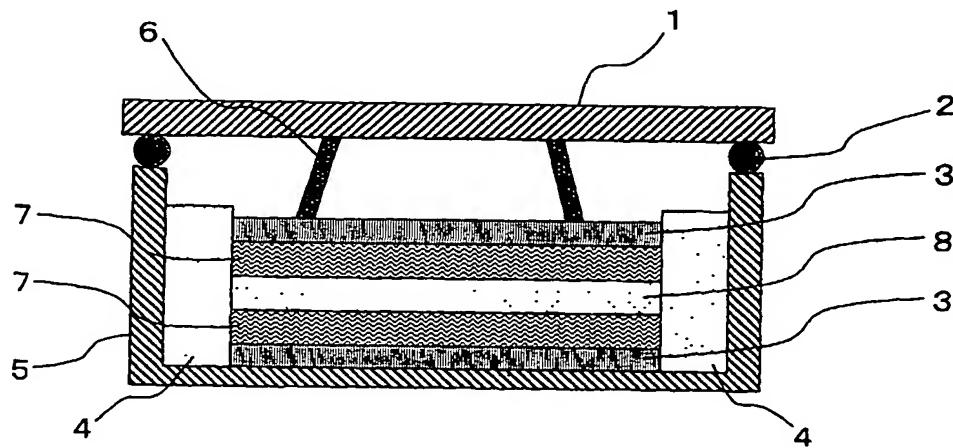
Published:

— with international search report

(88) Date of publication of the international search report:  
21 October 2004

[Continued on next page]

(54) Title: ACTIVE CARBON, PRODUCTION METHOD THEREOF AND POLARIZABLE ELECTRODE



WO 2004/043859 A3

(57) Abstract: The present invention relates to an active carbon containing an alkaline earth metal compound inside the particle and having a specific surface area of 10 to 2,000 m<sup>2</sup>/g, which is suitable to be used for polarizable electrodes in an electric double layer capacitor. The active carbon of the present invention enables to increase the capacitance of an electric double layer capacitor as well as to control the expansion of electrodes. The active carbon of the present invention can be obtained by adding an alkaline earth metal compound to a material such as pitch and performing heat treatment and activation.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/ JP 03/14379

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 C01B31/08 C01B31/12 H01G9/058

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C01B H01G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX, CHEM ABS Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE CA [Online]          CHEMICAL ABSTRACTS SERVICE, COLUMBUS,          OHIO, US;          YAMAMOTO, KAZUTOMI ET AL: "Double-layer          capacitor using activated carbon          electrode"          XP002274284          retrieved from STN          Database accession no. 130:74918 CA          abstract          &amp; JP 10 335189 A (FURUKAWA KIKAI KINZOKU          K. K., JAPAN)          18 December 1998 (1998-12-18)</p> <p>-----</p> <p>-/-</p>	<p>1-4,13,          14,22,          24-28,          31-33</p>

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the International filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the International search

22 March 2004

Date of mailing of the International search report

03.08.2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

Rigondaud, B

# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/ JP 03/14379

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE CA [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; MURAKAMI, SHIGERU ET AL: "Activated carbon fibers, manufacture of the fibers and activated carbon fiber fabrics, and batteries electrodes" XP002274298 retrieved from STN Database accession no. 134:134146 CA abstract	1-4,13, 14,22,27
A	& JP 2001 040548 A (SHOWA DENKO K. K., JAPAN) 13 February 2001 (2001-02-13) -----	28
X	TAMON H ET AL: "Improvement of mesoporosity of activated carbons from PET by novel pre-treatment for steam activation" CARBON;CARBON 1999 ELSEVIER SCIENCE LTD, EXETER, ENGL, vol. 37, no. 10, 1999, pages 1643-1645, XP001189060 * page 1644, Table 1, samples AC-2 and AC-4 *	1-6,8,10
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X	DATABASE WPI Section Ch, Week 199110 Derwent Publications Ltd., London, GB; Class D15, AN 1991-068946 XP002274268 & JP 03 016908 A (TAKEDA CHEM IND LTD) 24 January 1991 (1991-01-24) abstract	1-3
A	-----	28,33
X	DATABASE WPI Section Ch, Week 198239 Derwent Publications Ltd., London, GB; Class A96, AN 1982-82628E XP002274269 & JP 57 136455 A (SUMITOMO BAKELITE CO) 23 August 1982 (1982-08-23) abstract	1-4
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X	DATABASE WPI Section Ch, Week 197430 Derwent Publications Ltd., London, GB; Class E36, AN 1974-54261V XP002274270 & JP 48 093591 A (TEKKOSHA CO LTD) 4 December 1973 (1973-12-04) abstract	1-4
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		-/-

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/ JP 03/14379

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 191 935 B1 (IWAIDA MANABU ET AL) 20 February 2001 (2001-02-20) claims 1-6 -----	1,13,14
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 25, 12 April 2001 (2001-04-12) & JP 2001 210564 A (HONDA MOTOR CO LTD), 3 August 2001 (2001-08-03) abstract -----	1,13,14, 22,27,28
A	US 5 956 225 A (OKUYAMA KOHEI ET AL) 21 September 1999 (1999-09-21) the whole document -----	1,13,14, 22,27,28
A	EP 1 176 617 A (KURARAY CO) 30 January 2002 (2002-01-30) claims 1-21 -----	1,13,14, 22,27,28

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/JP 03/14379

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/ JP 03/14379

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-28, 30(part), 31, 32(part), 33(part)

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-28, part of 30, 31, part of 32, part of 33

The problem solved by the first invention is to provide:  
\* a method for producing an activated carbon comprising the following steps:

- adding an alkaline earth metal compound to the raw material
  - carbonizing this raw material in a non specified atmosphere
  - mixing this carbonized product with an alkali compound
    - heating this mixture thereby activating it.
- \* the activated carbon containing an alkaline earth metal so produced, its use in a polarizable electrode, the polarizable electrode so-obtained, an electric double layer capacitor using this electrode and an energy device containing this capacitor.

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2. claims: claim 29, part of 30, part of 32, part of 33

The problem solved by the second invention is to provide a method for producing an activated carbon comprising the following steps:

- adding an alkaline earth metal compound to the raw material
- carbonizing this raw material in the vapor of an alkali metal compound
- mixing this carbonized product with an alkali compound
  - heating this mixture thereby activating it.

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